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ON WATER-GLASS, AND ITS APPLICATION TO THE ARTS AND MANUFACTURES.

By FREDERICK RANSOME, C.E., IPSWICH.

The articles upon the subject of Water Glass, by Dr. Fuchs, which have recently appeared in the *Journal of the Society of Arts* of the 17th and 24th of June last, and the recent report of the Commission of the French Government on the experiments of Professor Kuhlmann,* would lead to the conclusion that the important subject of silicification and the various applications of soluble glass are comparatively unknown in this country, the more so, as no reference whatever is made either in the report or the articles in question to English discoverics and manufactures dependent upon the same principles.

As the inventor and patentee of various processes, in every respect analogous and almost identical with those suggested in the articles alluded to; as having, during the last fifteen years, occupied myself exclusively in modifying and improving the manufacture, and applying successfully on a large scale, the soluble glass to various useful purposes previously unknown in this country, I may be allowed to claim the attention of the Society of Arts to the great injustice of bringing so prominently forward as a novelty, in so important a scientific journal, the history and results of experiments conducted by foreign chemists in the manufacture and use of a material for which *I received the Telford Medal of the Institution of Civil Engineers, in* 1848; *a Prize Medal from the Jury of the Great Exhibition in* 1851; and which I have been manufacturing at the rate of many tons per week at my own works, and more lately at those of the Patent Silicious Stone Company, at Ipswich.

My own attention was first directed to the subject in the year 1844, when carrying out a series of experiments with a view to the production of an artificial stone suitable for grinding, building, and ornamental purposes, which should possess all the advantages, and be free from many of the defects of the natural stones hitherto in use. I found that with few exceptions the hardest and most durable stones were those containing the largest proportion of silica, and I at length succeeded in producing a compact stone by combining or cementing the particles of silicious sand by means of a silicious paste or cement, for which I secured a patent bearing date 25th of October, 1844. In preparing this silicious paste or cement, I first dissolved soda or potash in water, which I rendered caustic by means of lime. Then, under the influence of steam pressure in an iron boiler, I dissolved broken flints in the caustic soda or potash until I obtained a silicate adapted to the purposes required. This silicate I afterwards mixed with the requisite quantity of sand, broken stone, or other silicious matter, which, after being moulded into the desired form, was placed in a kiln and raised to a bright red heat. By this last operation, the soluble silicate, by combining with additional silica, was converted into an insoluble compound, and a stone was produced resembling, both in appearance and characteristics, the best descriptions of natural sandstone.

I was not at that time aware of the memoirs published by Dr. Fuchs, in Kastner's Archiv, for 1825; nor of the further researches either by him or Professor Kuhlmann; nor have I yet learned that either of those gentlemen attempted, or even contemplated, the manufacture of stone by such process, but, on the other hand, I may be allowed to state that I secured a patent in France for this very process in the year 1845.

I soon, however, discovered, that owing to the presence of a portion of sulphate of soda, an efflorescence of this salt was likely to take place on the surface of the artificial stone thus made, when exposed to the weather, which greatly diminished the value of the article in its application to architectural and ornamental purposes, but it was not until the year 1853, after many discouragements, and a series of experiments involving a large outlay of money, that I discovered the means of preventing this efflorescence by the use of a solution of baryta, and thus succeeded in perfecting the manufacture of an article which has now received the approval of some of our most eminent architects, chemists, and geologists.

In the year 1845 I obtained letters patent in England, Scotland, and Ireland, for the application of a soluble silicate for combining small coal into blocks, and for preserving wood from fire and decay.

In the year 1854, and still without any knowledge of the work done by Dr. Fuchs or Professor Kuhlmann, I invented a process for "preparing oxides and carbonates of lead or zinc," "and carbonates or sulphates of barytes with soluble silica," either with or without being "mixed with colouring or other matter," and enrolled a provisional specification, intending to complete the patent for the same, but owing to an attack of illness I was prevented from obtaining this protection.

In the year 1855 I claimed and obtained a patent for further improvements in the manufacture of artificial stone; and, lastly, in 1856, I invented and patented a process for preserving natural or artificial stone and other building materials, and rendering them less liable to decay. At this time I was made aware that a soluble silicate of potash or soda had been for sometime past employed upon the Continent for the purpose of preserving the stone of some public buildings, but I found in carrying out my operations, that although this process had been favourably reported upon in France, and that, under certain conditions, an apparently satisfactory effect was sometimes produced, yet it was nevertheless very imperfect. The general results, as obtained by the application of the simple silicate in our own country, being very uncertain, it appeared to me that one great cause of failure arose from the fact that the silicate being applied in a soluble form, it was liable to be removed from the surface by rain, or even by the humidity of the atmosphere, before the alkali of the silicate could absorb sufficient carbonic acid to precipitate the silica in an insoluble form. But another great and serious defect in this process still existed, viz., that even were it possible to effect the precipitation of the silica, still it would be simply in the form of a gelatinous hydrate possessing no cohesive properties in itself, and, therefore, capable of affording but little (if any) real protection to the stone. It seemed to me, therefore, necessary not only to adopt a process which should ensure an insoluble precipitate independently of the partial and uncertain action of the atmosphere, but that to render such a means efficient, a much more tenacious substance than merely precipitated silica must be introduced, and, in the course of my experiments I found that by the application of a second solution, composed of chloride of calcium, *a silicate of lime* would immediately be produced, possessing the strongest cohesive properties, and perfectly indestructible by atmospheric influences.

The mode of application is simply this:—The stone or other material of which a building may be composed should be first cleaned, by the removal of any extraneous matter from the surface, and then brushed over with a solution of silicate of soda or potash (the specific gravity of which may be varied to suit the nature of the stone, &c.); when dry, this is followed by a solution of chloride of calcium, applied also with a brush; the lime immediately combines with the silica, forming silicate of lime in the pores of the stone, whilst the chlorine combines with the soda, forming chloride of sodium, or common salt, which is removed at once by an excess of water. Experience has shown that when the

* See last No. of *Journal*, p. 584.

silica is once applied to the stone in this manner, it is impossible to remove it unless with the surface of the stone itself.

The application of this process, which I also patented in France, in March, 1857, has, in every instance in which I have operated, been attended with the most satisfactory results; decay has been prevented in the softest and most friable stones, and where disintegration had commenced prior to its use, this has been at once arrested, and the same stones rendered perfectly hard and durable.

Amongst other buildings which have been satisfactorily treated by this process, I may allude to the Baptist Chapel in Bloomsbury, the Royal Pavilion at Brighton, and the Custom-house at Greenock, in each of which buildings the stone which before was seriously decomposed is now hard, and I have every reason to believe is permanently preserved, whereas I am not aware of a single instance in which the application of the silicate of potash, or water-glass alone, has proved beneficial in effectually preserving the stone of any public building in this country.

I would further observe that my various inventions and improvements have been the result of observations made in the actual manufacture and use of the soluble silicate, and that this material is now and has long been largely used in this country for the purposes already described, as also in several other important branches of manufacture. It is not my desire to detract from the value of the results obtained by Dr. Fuchs and Professor Kuhlmann's indefatigable and persevering investigations, which unquestionably have conferred great and lasting benefits upon the community at large; but having (as I think I have satisfactorily shown) devoted so large a portion of my life, and embarked a considerable outlay of money in conducting similar experiments, and bringing the same to a successful and practical application in this country, to the future development of which, and to the just recognition of my claims by the public, I naturally look for a return; I feel it due to myself and the interests of my family that my position shall be clearly understood, and with this view I appeal to the Society of Arts, so that, whilst extending through their *Journal* the knowledge of the valuable researches and discoveries of men of science in other countries, they may not unconsciously commit an act of injustice towards the inventors of our own land.

Ipswich, July, 1859.

P.S.—I append copies of reports I have received from Professors Henry, Ansted, and Hunt.

(Report by Professor T. H. HENRY, F.R.S., &c.)

DEAR SIR,—I have carefully examined your process for the "Preservation of Stone," &c., and I believe it to be in all respects calculated to answer the purpose intended.

It is known to chemists that silicate of lime is one of the substances best adapted to resist both the influence of the atmosphere and also the action of sea water. The affinity of silica for lime is so great, that if a piece of clay very gently calcined, or a little gelatinous silica be placed in a solution of lime water, the whole of the lime is quickly abstracted from the solution, and enters into solid combination with the silica, forming an insoluble silicate of lime. This is precisely the substance you form in the very pores, and upon the surface of the stone. It is a tough substance, is not friable, and is not acted upon by carbonic acid or by dilute acids generally.

I found that pieces of Bath stone, when placed in very dilute sulphuric acid, were soon deeply corroded, and universally over the whole surface, whereas the same stone placed in the acid for an equal length of time, after having been subjected to your protective treatment, was entirely unacted upon, retaining all its sharpness of outline, and having lost nothing in weight. Each stone similarly treated was found to resist the action of the acid completely, whereas when unprotected by your process, it was entirely broken up, falling into fragments.

I believe you have hit upon the right substance for protecting stone from decay; it is identically the same that has conferred durability upon the old Roman mortar still unchanged after two thousand years, and upon the hydraulic cement with which the foundation of the Eddystone Lighthouse was built after the numerous interesting experiments of Smeaton on the subject.

I repeat, therefore, that I consider your process to be by far the best hitherto proposed, and I think it would be impossible to obtain such evidence of the durability of any other artificial substance capable of being applied to the surface of stone for its preservation.

Yours, truly,

(Signed) T. H. HENRY, F.R.S., &c.

To Mr. Frederick Ransome.

(Report by Professor D. T. ANSTED, M.A., F.R.S., &c.)

The process adopted by Mr. Frederick Ransome for preserving soft or porous stones used for construction, whether fresh, or already in a partially decomposed state, appears to me to be founded on correct principles, and has succeeded hitherto in every case, so far as I am informed, in which it has been fairly tried. Taking advantage of the very peculiarity of structure of the stone itself which renders it destructible, viz., its absorbing power, it introduces into the pores a mineral substance soluble in water; and then, by allowing the stone to absorb a second preparation, also soluble, a complete double decomposition takes place, and a perfectly insoluble and non-absorbent film is formed and left behind in the substance of the stone within its outer surface, which resists completely, not only the action of the weather, but all those acids contained in the atmosphere of large towns. The colour of the stone can be imitated in the preparation without in the least affecting the result, and the induration appears to be of such a nature, that it might be used with equal success in the temperate damp climate of our own country, in perfectly dry climates, or in hot moist climates in the tropics.

It is also equally applicable to absorbent stones without regard to their mineral composition.

(Signed) D. T. ANSTED, M.A., F.R.S.

December, 1858.

(Report by ROBERT HUNT, Esq., M.A., F.R.S.)

The importance of the discovery of a process which could be relied on, for the preservation of the stones employed in the erection of our public and other buildings, has long been felt, and many experiments have been made in the hope of attaining this object. In London, and in several of the large towns in the provinces, I can point to buildings which have within a very few years, exhibited the most unmistakeable signs of decay. Layer after layer falls off, exposing a new surface to be freshly acted upon by the destroying agent, and thus, with comparative rapidity, the work of decay progresses; this has been referred to atmospheric causes, existing now as the result of our extensive manufactories, and greatly increased population, but to whatever cause the disintegration of the stone may be traced, certain it is, that scarcely any modern buildings whether constructed of the coal measure, sandstones, dolomites, oolites, or other well-known building stones, but exhibits in a few years after its completion lamentable evidences of decay.

My attention has been directed to the Baptist Chapel built by Sir Morton Peto, in Bloomsbury. For some time past the Caen stone used in this structure has been crumbling, especially where it was exposed to the action of water. The disintegration was proceeding so rapidly that it became necessary to give immediate attention to it. It was determined that Mr. Frederick Ransome should make an experiment upon the towers, where the stone was in a worse condition than in any other part. The result of this experiment was so satisfactory, that it was resolved that the entire building should be subjected to this process.

The most enduring stones in nature are those in which the cementing agent is silica, and it became a problem with the patentee to produce a true silicious surface upon any stones which appeared naturally liable to decay. All the sandstones are more or less porous, consequently they absorb water readily; this is one great cause of their rapid disintegration. Availing himself of this, Mr. Ransome produces the desired results. First, the stone is made to absorb as much of a solution of the silicate of soda as possible; this being effected, it is washed with chloride of calcium. The play of chemical affinity is now brought into action in the stone, a double decomposition is effected, and insoluble silicate of lime fills the interstices;

chloride of sodium (common salt) being formed, which is readily removed. It will be evident to all, that since every particle of the stone to the depth penetrated by the solution, is surrounded by this silicate of soda, and that too—according to the law of surface action—in a concentrated form, that the silicate of lime which results from the action of the chloride on it, must completely fill the interstitial spaces, and thus render a stone, which was previously absorbent, absolutely non-absorbent.

It will be found that the stone surface of the Rev. W. Brock's chapel is now actually repellent of water, and that the hardness of the surface indicates a complete casing of the preservative silica. It should be distinctly understood that this process will not merely protect new stone from the influences of atmospheric action, but that it stops decay in stones already exfoliating, and preserves them from future action. Stones which have been in a state of rapid decomposition have been, for experiment, partially treated by this silicifying process. The result has been that the prepared parts have withstood the action of air, rain, and frost, showing no signs of injury, while the unprepared parts have completely broken up.

Beyond this, its preservative power, another advantage of the process is, that it can be applied to any stone without in the slightest degree affecting its colour or grain; all the natural conditions are preserved, and the hardening superinduced.

Now that a well-known public building has been treated by this process, the result can be observed by everyone. The rationale of the process alone—independently of the experiments which have been made—satisfies me that there is little chance of disintegration ensuing after the proper application of the solutions.

(Signed) ROBERT HUNT, M.A., F.R.S.

HISTORICAL ACCOUNT OF THE INTRODUCTION OF THE GALVANIC AND ELECTRO-MAGNETIC TELEGRAPH.*

By Dr. HAMEL, Member of the Imperial Academy of Sciences at St. Petersburg.

The art of telegraphing by means of galvanism and electro-magnetism is certainly the most interesting application of scientific acquirements ever made to purposes useful to society at large. By means of it, ere long, the inhabitants of the various parts of the globe will be able to correspond with each other, through oceans and seas, to a far greater extent than is probably within the expectation of most people.

I have taken considerable pains to find out the origin of the first telegraph made to work by a galvanic battery. Through it the Russian Baron Schilling was induced to follow with enthusiasm the art of telegraphing, and he subsequently made at St. Petersburg the first electro-magnetic telegraph, which, in a curious way, caused the introduction of such telegraphs in England.

That Soemmerring in Germany made a telegraph, in which the chemical action of the galvanic current on water produced the signals, is known, but nobody has taken the trouble to discover how he was induced to construct it. Even the time when it was made is nowhere accurately given. Sometimes it is stated wrongly by two, three, and, in one case, by nine years. It is surprising that the highly meritorious Steinheil, who lives in the very place where Soemmerring had made the first galvanic telegraph, errs likewise by two years. He also, like Poppe and Kohl, is not correct in his description of the apparatus.

From a minute and careful examination of the late Dr. Soemmerring's papers, I am enabled to show that on the sixth of August this year (1859) it will be half a century since the first galvano-electric telegraph was made.

Dr. Samuel Thomas von Soemmerring, born in 1755, at Thun, and deceased in 1830 at Frankfort-on-the-Maine, had studied at the University of Göttingen. In the year 1778 he travelled in Holland, England and Scotland. From 1779 till 1784 he was at Cassel, and from 1785 till 1796 at Mayence, Professor of Anatomy. From 1796 to 1805 he practised medicine in Frankfort, and from 1805 till 1820 he was a member of the Academy of Sciences at Munich, where the King of Bavaria had given him the title of Privy Counsellor. His great merits as an anatomist and physiologist are universally known.

Galvanism had interested him, like Humboldt and others, principally in the hope of being able to make its study useful to clear up some of the most mysterious portions of physiology. I find, however, that he had already, in November 1801, paid attention to the chemical action of the galvanic current. In January, 1808, he, together with another member of the Academy of Sciences at Munich, the well known chemist Gehlen, had made a communication to that academy in reference to the brilliant galvanico-chemical discoveries of Humphry Davy, at the laboratory of the Royal Institution in London.

It seems to me quite certain that an event in connexion with the war against France, brought on by Austria fifty years ago, in 1809, gave rise to the first galvano-electric telegraph.

The Austrian troops had on the 9th of April, 1809, begun to cross the river Inn, and so entered Bavaria quite unexpectedly. King Maximilian had hardly been informed of this, when he, on the 11th, with his family, in all haste, retired from Munich to the western frontier of his kingdom, to the town of Dillingen. He took with him Baron (soon afterwards created Count) Maximilian Joseph von Montgelas, who was then at the head of two important branches of administration in Bavaria—the foreign and the home departments.

By means of the line of Chappe's optico-mechanical telegraphs, established, already for some time, from the French frontiers to Paris, the Emperor Napoleon I. got information of this sudden aggressive movement of the Austrian troops much sooner than it was thought possible in the Austrian army, and he, without the least delay, started from Paris for Bavaria, on his way to the army. He came so totally unexpected to Dillingen, that he found King Maximilian in bed.

There is no doubt, that by the speedy arrival of the Emperor Napoleon I. in the midst of his army, Bavaria owed its delivery from the Austrians. Munich had been already, on the 16th of April, occupied by the Austrian general Jellachich, but he was, in less than a week after, on the 22nd, obliged to withdraw, and King Maximilian could again enter into his capital.

This event, so vitally important for Bavaria and for Munich, must there have directed special attention to the utility of telegraphs. The minister Montgelas had been witness of the surprise caused by the French Emperor's unexpected arrival at Dillingen. The Bavarian Academy of Sciences was in his department of administration, and Dr. Soemmerring, as one of its most celebrated members, was from time to time invited to come to dine with him at Bogenhausen, near Munich, where he lived.

This was the case on the 5th of July, 1809, when the minister expressed to him the wish to get from the Academy of Sciences proposals for telegraphs, having, as I allow myself to suppose, in view no other but optical (mechanical) telegraphs with improvements.

Soemmerring, referring to this dinner, noted in his diary only: "The minister wishes to get from the Academy proposals for telegraphs."

He at once resolved to try whether the visible evolution of gases from the decomposition of water by the action of the galvanic current might not be applied to telegraphic purposes, and three days after this dinner, he noted in his journal: "I could not rest till I realised the idea to make a telegraph by the evolution of gases."

On the 22nd of July, his apparatus was already so far

* Some time since there appeared in the *Journal* two short extracts from Dr. Hamel's communications to the Imperial Academy of Sciences, at St. Petersburg, relating to the history of the introduction of the galvanic and electro-magnetic telegraph. Having now received from Dr. Hamel a detailed account of the results of his laborious researches on this interesting subject, the Editor has much pleasure in laying it before the readers of the *Journal*.

advanced, that it was fit to work. He wrote: "At last the telegraph is finished;" also: "The new little telegraphic machine works well."

He, however, went on making still further improvements, and it was only on the 6th of August that he considered the telegraph quite completed. He was much pleased with its performance, being able to work through 724 feet of wire. He noted that day: "I tried the entirely finished apparatus, which completely answers my expectation. It works quick through wires having the length of twice 362 Prussian feet, so that the current passes along 724 feet."

Two days later, he could already telegraph through one thousand, and, on the 18th August, through as much as two thousand feet of wire.

On the 29th of August he exhibited the telegraph in action before a meeting of the Academy of Sciences at Munich.

He now wished to send his telegraph to the National Institute at Paris, and for doing so an apparently favourable opportunity presented itself.

An old acquaintance and scientific correspondent of Soemmerring, the chief surgeon of the French army, Baron Dominique Larrey, came on the 4th of November to Munich, on his return from the French army, which had been acting against the Austrians in the battles of Aspern, Esslingen, and particularly at Deutsch Wagram, near Vienna. He brought with him from the battle-fields some interesting pathological objects for his friend's collections.

Soemmerring, of course, showed Larrey his telegraph, and the latter at once consented to take it with him to Paris. Next day Larrey even assisted at the packing.*

After Baron Larrey's departure from Munich, Soemmerring composed a description of his telegraphic apparatus in French, under the title: "Mémoire sur le Télégraphe," which, on the 12th of November, he forwarded to Larrey, in Paris. As he flattered himself that the Baron would find an opportunity to exhibit the telegraph before the Emperor Napoleon, he begged, in his letter, to be informed with what attention his Imperial Majesty might honour his invention. He also hoped that some members of the Institute might approve of it. Soemmering did not for a long time receive any account from Baron Larrey. At last the latter wrote that he had presented the telegraph in the beginning of 1810 to the Institute, but no resolution had been come to.

I have been permitted, in Paris, to examine the Journals of the Meetings of the Institute, and have found that Baron Larrey was in his letter—as also afterwards in a printed statement—incorrect with regard to the date; he presented the telegraph on the 5th December, 1809.

Under this date the following entry is made: "M. Larrey, au nom du Docteur Soemmerring, professeur à Munic, présente un télégraphe à pile galvanique qui peut servir la nuit." The Institute appointed Biot, Carnot, Charles, and Monge (who were all four present at the meeting) to examine the apparatus, and to report upon it, but, although I have carefully looked over all the journals for nearly two years following, I have found no report. Biot, the only surviving one of the four members appointed to examine the telegraph, and to whom I have spoken on the subject, cannot recollect the reason why no report was made. Soemmerring received his telegraph back on the 12th of May, 1811, full eighteen months after having intrusted it to Larrey.

The reason why Soemmerring's contrivance received so little attention in France, may have been that the optical telegraph lines, established by the Chappes, were considered to answer sufficiently well.

Larrey inserted in the number for April, 1810, of the "Bulletin de la Société médicale d'émulation," a notice of the telegraph, in which he speaks with much detail of the analogy which the many wires of the galvano-electric cord seemed to present with the single fibres of a nervous trunk, to which analogy Soemmerring had pointed in the Mémoire, prepared for Larrey, as well as in his original description of the telegraph printed in the "Denkschriften" of the Academy of Munich, for 1809 and 1810. Larrey's said article appeared again, nearly twenty years later (in November, 1829), in his "Clinique Chirurgicale."

In both these publications of Baron Larrey's the telegraph is placed in the midst of pathological and surgical subjects, where one would hardly look for an invention made for telegraphic purposes.

On the 9th of December, 1809, Ludwig Karl, then Crown Prince of Bavaria—who in 1825 became King, and abdicated in 1848—honoured Soemmerring with a visit. Unfortunately the new telegraph, which was to replace the original one taken by Larrey to Paris, was not yet quite ready to perform experiments with.

At the time when Soemmerring became a member of the Academy of Sciences at Munich, in 1805, there was attached to the Russian mission in that capital the Baron Pawel Lwowitsch Schilling (of Canstadt). About a year after the invention of the telegraph, on the 13th of August 1810, Schilling saw experiments performed with it. He was so forcibly struck with the probability of a very great usefulness of the invention, that from that day galvanism and its applications became one of his favourite studies. He brought many persons, from Russia as well as from other countries, to Soemmerring, that they might see his telegraph. The Russian minister, Prince Bariatinsky, repeatedly visited Soemmerring, and invited him to his house.

Ten days after Baron Schilling's first taking notice of the telegraph, on the 23rd of August, 1810, Soemmerring succeeded in inventing a contrivance for sounding an alarum, which answered perfectly well. He made the gas, rising in small bubbles from two of the wire points in the water, collect under a sort of inverted glass spoon at the end of a long lever, which, rising, made a second bent lever in the opposite direction, on the same axle, descend and throw off a little perforated leaden ball, stuck lightly on it, which, falling on an escapement, set the clockwork in action.

This alarum arrangement gave Soemmerring much pleasure, which he expressed in his journal with some detail. He wrote: "If the principal part of the telegraph gave me no trouble and demanded no alteration, but was

* As Baron Larrey was the person who took the first galvano-electric telegraph ever made away from the place of its invention, I think it not improper to say here a few words in remembrance of this man, who has, during more than half a century, made himself useful in military hospitals and on fields of battle. To him the army owes the improved "ambulances volantes." He had begun his career, in 1788, by a voyage to Newfoundland, where the New World has recently been telegraphically, though not yet permanently, united with the Old, and ended in 1842 with a voyage to Algiers in Africa. The last of his numberless surgical operations he performed at Bona, to which place the cable from Europe through the Mediterranean Sea has lately been laid. He had accompanied Napoleon I. to Egypt, and made also, besides other campaigns, in 1812, the one to Moscow. During the battle at Wagram, near Vienna, which closed the Austrian campaign, Napoleon I. had, on the 6th July, 1809, (the day on which Soemmerring began to make his telegraph) created him a Baron, and subsequently at St. Helena, in his will, he left him one hundred thousand francs, adding, "C'est l'homme le plus vertueux que j'aie connu." In August and September, 1826, Baron Larrey had made a tour in England, Scotland and Ireland with his son Hippolyte, now Surgeon-in-Ordinary to the Emperor Napoleon III., whom he lately accompanied to Italy. He died in 1842. In the court before the former military hospital, now military medical school, Val de Grace, in the Rue St. Jacques, at Paris, where he had been long usefully active, his statue in bronze is placed on a monument, erected in 1850. Larrey is represented pressing Napoleon's last will against his heart. Of the four bas-reliefs on the pedestal, one refers to the campaign in Egypt, one to that in Spain, the third to the battle of Austerlitz in 1805, and the fourth to the dreadful passage of the French army over the river Berezina, on the retreat from Moscow in 1812.

ready in a few days, this secondary object, the alarum, cost me a great deal of reflection and many useless trials with wheelwork, which was driven by the streams of gas in the water to set the clockwork going, till at last I hit upon this very simple arrangement."

Soemmerring's alarum has not become generally known, because it is not represented on the two plates which accompany the description of his telegraph in the Memoirs (Denkschriften) of the Munich Academy, published only in 1811. These plates were already engraved before the alarum was invented. The drawings were made by Christian Koeck, who had formerly, at Mayence, been Soemmerring's draftsman, but who now had just returned from Moscow, where he had been employed by Gotthelf Fischer for the Imperial Society of Naturalists.

On the 7th of September, 1810, Soemmerring called on Baron Schilling to invite him to his lodgings, in order that he might have the pleasure of showing him the action of the telegraph through wire carried round the whole house in which he then lived. It was Leyden's house, nearly opposite the Max Gate. The wires were first covered with a solution of india-rubber, and then varnished.

On the 25th October, the then newly-married Crown Princess of Bavaria, Princess Therese of Saxe-Hildburghausen, aunt to Her Imperial Highness the Grand Duchess Constantine of Russia, honoured Soemmerring with a visit to see his telegraph. She came accompanied by her mother, aunt to his Highness the Duke of Mecklenburg Strelitz, who is married to Her Imperial Highness the Grand Duchess Catherina Michailowna of Russia.

On the 6th of April 1811, a renowned warrior, General Erasmus Deroy, who in the following year, on the 18th of August, was mortally wounded near Polotzk, in Russia, where he died and lies buried, came accompanied not only by two aides-de-camp, but by several foreign Ministers, to see the action of Soemmerring's telegraph.*

On the 7th of May, Baron Schilling introduced to Soemmerring Baron Comeau, a Lieutenant-Colonel in the service of Bavaria, who repeated his visit on the following day, to get a thorough knowledge of the telegraph. I mention Baron Comeau's visit principally for the reason that he subsequently gave Soemmerring the first account of Schilling's operations with a subaqueous galvanic conducting cord through the river Neva, at St. Petersburg, in the year 1812.†

On the 14th of May, Baron Schilling introduced to Soemmerring Count Jeroslas Potozki, a Russian Colonel of the Engineer Corps, one of the many sons of Count Stanislas Felix Potozki. On the 20th, this Colonel saw experiments with the telegraph, and on the 25th he came again to request Soemmerring to let him have an apparatus, in order that he might be able to exhibit it at Vienna and at St. Petersburg. Soemmerring promised to get one ready.

On the 22nd May, the Minister Count Montgelas and his lady visited Soemmerring, to see experiments with his telegraph.

On the 5th of June, Baron Schilling proposed to Soemmerring to try the action of the telegraph whilst the two conducting cords were each interrupted by water contained in a wooden tub. The signals appeared just as well as if no water had been interposed, but they ceased as soon as the water in the two tubs was connected by a wire, the current then returning by this shorter way.

On the following two days, the 6th and the 7th June, Soemmerring made, together with Baron Schilling, first across a canal on the river Isar, and then along the river itself, experiments similar to those made by Galvani's nephew, Giovanni Aldini, in 1803, near Calais, in the sea, and near Charenton on the river Marne, not far from its junction with the Seine.*

At these experiments Count Potozki, and also the well known Bavarian engineers, Baader and Wiebeking, were present. Baader had seen the telegraph in Soemmerring's house on the 26th of May.

On the 9th of June, Soemmerring delivered to Count Potozki, the telegraph intended to be shown at Vienna and at St. Petersburg.

On the 5th of July, Count Potozki communicated to Soemmerring from Baaden, near Vienna, that he, on the 1st of that month, had had the honour to exhibit his telegraph in action before his Majesty the Emperor Francis I., the Empress, and the Archdukes Charles and John, who had all been highly pleased. ("Ils en furent enchantés.") The Emperor expressed his desire to have a telegraphic line established between the capital Vienna and his country palace Laxemburg (a distance of nine miles).

On the 28th July, the aeronaut Robertson saw experiments with Soemmering's telegraph. At his request he obtained an apparatus which he took with him to Paris.†

On the 22nd August, Prince Leopold of Saxe Coburg, now King of the Belgians, honoured Soemmerring with a visit to see the telegraph in action. He was accompanied by the Saxon Minister, Count Einsiedel.

In September, Soemmerring simplified his telegraph considerably; he reduced the number of wires in his conducting cord from 35 to 27.

On the 9th October, Baron Comeau had introduced the then Bavarian Minister at Paris, Anton de Cetto, to Soemmerring, that he might see the telegraph. He was accompanied by his son, now Bavarian Minister in London, Baron August de Cetto, who well recollects this visit.

On the 15th November, Soemmerring sent a newly made telegraph to his son Wilhelm, at Geneva, where he was at that time studying, and who is now a medical practitioner at Francfort.

The editors of the "Bibliothèque Britannique," August and Charles Pictet and M. Maurice, inserted a description of it in their journal, in which there are many errors, although Soemmerring had sent an account, drawn up by himself, along with the instrument. They printed that the telegraph was invented a few months before that time (the beginning of January), whereas the first telegraph had been made more than two years earlier.

Soemmerring had sent, along with Koeck's engraved plates of the telegraph apparatus, a drawing, made expressly for that purpose, by the same artist, of the alarum, but in the plate, done at Geneva, it is not correctly given. I am in possession of a faithful representation of this early alarum.

On the 28th and 29th November, Soemmerring had visits from Baron Alexander von Humboldt.

On the 1st of February, 1812, Prince Karl Theodor, the second son of King Maximilian I, honoured Soemmerring with a visit to see the telegraph.

On the 4th of February Soemmerring announced that he was able to telegraph through 4,000 feet of wire, and on the 15th March he telegraphed even through 10,000 feet.

In the spring of 1812, Baron Schilling was endeavouring to contrive a conducting cord, sufficiently insulated that it might convey the galvanic current, not only through wet earth, but also through long distances of water.

* Two days after the General's death, Napoleon I., whose head-quarters were at a distance, had created him, by a rescript, Count of the Empire, and bestowed on him a dotation of 3,000 francs.

† Comeau had made, in 1812, as Colonel, the campaign of Russia, where he was wounded one day before General Deroy.

* A representation of the experiment made near Calais is given on plate 8, in Aldiné's book, "Essai théorique et expérimental sur le Galvanisme."

† This was the same Robertson with whose assistance the Imperial Academy of Sciences at St. Petersburg had, in the month of July, 1804, instituted a balloon ascent for scientific purposes, which was previous to Biot's and Gay-Lussac's ascent (on the 24th August), and Gay Lussac's (on the 16th September) in the same year. In the last (eighth) edition of the Encyclopædia Britannica (1853), it is erroneously stated, that the two latter ascents had been the first ever undertaken solely for objects of science.

The war then impending between France and Russia made Baron Schilling desirous of finding a means by which such a conducting cord should serve for telegraphic correspondence between fortified places and the field, and likewise for exploding powder-mines across rivers.

On the 8th of April Soemmerring wrote in his diary: "Schilling arrives, almost out of breath, with his idea about blowing up mines. Take care! Take care!"

On the following day Schilling came not less than four times to Soemmerring.

On the 13th May, Soemmerring wrote: "Schilling is quite childish about his electro-conducting cord."

On the 20th of July Schilling departed for St. Petersburg, as the Russian mission in Munich, on account of the then political circumstances, was dissolved. Soemmerring expressed in his diary the deep regret he felt at losing his interesting society.

In Russia Baron Schilling continued his endeavours to obtain the means necessary for being able to blow up powder mines without approaching them for the purpose, and even across rivers of considerable breadth, by the galvanic current. Not only had he already a subaqueous conductor, but he invented an ingenious, though simple, way of igniting the powder by means of pieces of charcoal, shaped in such a manner that they did not fail to produce the effect. In the autumn of 1812 he actually exploded powder mines across the river Neva, near St. Petersburg.

In 1813 Baron Schilllng joined the army as "Staabsrittmeister" in a regiment of huzzars (the Ssoumsky regiment) and in 1814 he was active in the engagements near Bar-sur-Aube on the 27th February, near Arcis-sur-Aube on the 20th and 21st, near Fere Champenoise on the 25th, and in that close to Paris on the 30th March. On the following day he entered Paris with the Russian and allied troops, headed by the Emperor Alexander I.

Baron Schilling has told me that during his stay at Paris he, with his subaqueous conductor several times, to the astonishment of the lookers-on, ignited gunpowder across the river Seine.

In one of Soemmerring's later letters to Baron Schilling, he, alluding to his subaqueous conductor, says that the means found out by him (Schilling) to ignite, by the galvanic current, gunpowder at a distance (das Fernzünden) were more difficult to discover than his, Soemmerring's, signalising at a distance (das Fernzeichengeben).

After Baron Schilling's departure from Munich, in 1812, Soemmerring occupied himself less with the telegraph. His attention was directed to the dry voltaic pile, called after the Abbé Zamboni, who had made the first at Verona, where it was placed in the cabinet of the Vice-Roy of Italy, Eugene Beauharnois, afterwards Duke of Leuchtenberg.

From this pile, the action of which was considered, so to speak, perpetual, at that time great things were expected. Dr. Assalini, the surgeon of His Highness, who, like Larrey, had been with Napoleon I. in Egypt, and in 1812, with Prince Eugene, in Russia (where he got his feet frozen), was in June and July 1814 a good deal with Soemmerring at Munich. He printed there a description of "the perpetual (immerwährender) electromotor." On the 14th of June he exhibited to the Academy of Sciences a pair of piles, belonging to his Highness the Vice-Roy.

On the 2nd October, Soemmerring showed the telegraph to two well-known scientific gentlemen, Professor Pfaff and Dr. Jager.

On the 8th of May, 1815, he had the honour of a visit from the late Empress of Russia, Elizabeth Alexejewna. Her Imperial Majesty was accompanied by the King and Queen of Bavaria. Among other galvanic apparatus, Soemmerring showed their Majesties a second-striking pendulum clock, set in motion by Zamboni's dry piles, which had just then been made by Aloys Ramis, the mechanic in the employ of the Academy of Sciences.

On the 17th of July Baron Schilling came, quite unexpected, again to Munich. He was now anxious to acquire every information about a useful art that had been developed at Munich, namely, the art of lithography, in order to introduce it in Russia. Four days after his arrival, Schilling introduced Soemmerring to Count Fedor Petrovitch Von der Pahlen, then lately appointed minister from Russia. Soemmerring accompanied his Excellency that day to the Academy, that he might see the cabinet of natural philosophy and other collections. Count Pahlen showed himself as friendly to Soemmerring as Prince Bariatinsky had done formerly. Not only did he come himself to study the telegraph, but he brought, for that purpose, many other persons to Soemmerring.

On the 29th December there came to pay his respects to Soemmerring, while Baron Schilling was just with him, the well known natural philosopher, Johann Salomon Christian Schweigger, then professor of natural philosophy and chemistry at the physico-technical Institute, (Realinstitut), at Nürnberg, who was on his way to Paris and London, in which latter place I had afterwards the pleasure of making his acquaintance.

Soemmerring showed Schweigger the next morning the telegraph, of which he had in the year 1811, immediately after the appearance of its description in the "Denkschriften" of the Munich Academy, inserted an account in the "Journal für Chemie und Physik," which he had, since the commencement of the year mentioned (1811), edited. In the remarks, there added by Schweigger, he had found fault with Soemmerring, for not having indicated any means of calling at the distant station the attention of the clerk to the instrument, when a message was to be sent, and he proposed, for that purpose, to fire voltaic gas pistols.

We have seen that Soemmerring had succeeded in making an alarum soon after his description of the telegraph had been printed in the "Denkschriften," although not yet published. Schweigger was now pleased to see this alarum, and lost no time in getting it announced in his above named Journal.

It may not be out of place here to remark, that the worthy Abbé Moigno, in his "Traité de Télégraphie électrique" of 1852, is in error, when he (page 64) says that Schweigger had given the account of Soemmerring's telegraph, and made his remarks about the want of an alarum in the year 1838, in the "Polytechnisches Central Blatt," which, in the Abbé's opinion, Schweigger edited. This journal was edited by Julius Ambrosius Hülsse, teacher of mathematics, natural philosophy, and technology, at the commercial school at Leipzig. It contains an article on the electro-magnetic telegraph by Hülsse, which however does not treat on the subject the Abbé refers to. Schweigger had inserted the description of Soemmerring's telegraph, and made his remarks in the above cited "Journal für Chemie und Physik," not less than 27 years earlier, in 1811. In 1838 Schweigger had been already nine years in his grave.

Baron Schilling, having made at Soemmerring's the acquaintance of Schweigger, of course could not foresee that one day an invention of this gentleman, the multiplier, would enable him to make at St. Petersburg the first electro-magnetic telegraph.

Schweigger dined with Soemmerring and Schilling together at the so-called Museum, a sort of club, where many of the scientific persons of Munich used to meet, and where, in 1810, Baron Schilling had first become more intimately acquainted with Soemmerring.

On the 2nd of January, 1816, several experiments were made with Zamboni's pile. The most interesting were those relating to the action of the sparks from it on the air. Schweigger, who had himself in Nürnberg paid attention to Zamboni's pile, wrote afterwards to Soemmerring from Paris (10th May, 1816) that there the dry pile was regarded more as a plaything, but that Gay-Lussac had heard with interest the account he had given him about Soemmerring's experiments regarding the effect of the sparks from it on the atmospheric air.

Baron Schilling was now a good deal with Aloys Sene-

felder, the inventor of lithography, and also with Professor Mitterer, who directed an establishment for that art in Munich.*

In February, 1816, Dr. Thomas Thomson printed, in the Annals of Philosophy, that Dr. Redman Coxe, Professor of Chemistry at Philadelphia, in the United States, had informed him that he contemplated galvanism as a probable means of establishing telegraphic communications, and nominally by the evolution of gases from water. Coxe promised to follow up the idea, but he added that it would demand time. The Abbé Moigno, at Paris, states in both editions of his Traité de Télégraphie électrique (1849 and 1852) erroneously the year 1810 instead of 1816 for the announcement of Coxe's idea.

Dr. Thomson did not know that Coxe came six years and a-half too late with his idea. Soemmerring, at Munich, had, in 1809, executed, what Coxe in Philadelphia, in 1816, hoped in time to do, although it appeared to him, as he expressed it, a fanciful speculation.

On the 2nd of July, 1816, Baron Schilling introduced the British Envoy and Minister Plenipotentiary at Munich, the Hon. Frederic James Lamb—youngest brother to Lady Palmerston—to Soemmerring, in order that he might acquire a knowledge of his telegraph. Ten days later, on the 12th, he accompanied him again there to see the telegraph in operation. On this occasion were present: Baron Schilling's sister, the Countess Banfy, and her husband, Count Banfy. They resided at Vienna, but were then on a visit to Munich.

The Hon. F. J. Lamb was subsequently more than ten years British Ambassador at Vienna, where he married the daughter of the Prussian minister there, Count Maltzahn. In 1841, he had been created Baron Beauvale, and, in 1848, he succeeded his elder brother, the second Viscount Melbourne, who had been so many years Prime Minister of England, and after whom the capital of the colony Victoria in Australia, yielding so much gold, is named. He died on the 29th January, 1853. Soon after that time, Messrs. Butcher and McGowan had come from Canada to Melbourne with the intention of establishing telegraph lines in Australia. The first line was opened on the 3rd of March, 1854, from Melbourne to Williamstown; other lines in Victoria soon followed, and since last November (1858), the capitals of New South Wales and of South Australia (Sydney and Adelaide) are telegraphically united with that of Victoria (Melbourne). Ere long these lines will be joined to others in Tasmania, by means of a submarine cable to be laid across Bass's Strait.

So we know now, that the Honourable Francis James Lamb, third Viscount Melbourne, brother to Lady Palmerston, was the first Englishman that ever saw a telegraph put in action by a galvanic battery, and that it was the Russian Baron Schilling who invited him to take notice of it.

A Mr. John Robert Sharp, residing at Doe Hill, in Derbyshire, having read in the number for February 1816 of the "Repertory of Arts," a short account of Soemmerring's invention (taken from the "Denkschriften" of the Academy of Sciences at Munich, which were published in 1811) announced in the number for June of that same journal, that in 1813 he had made before the Lords of the Admiralty an experiment showing that the voltaic current might serve for telegraphic purposes. Mr. Sharpe did not know that Soemmerring had already made his telegraph in the year 1809, and, perhaps supposing it might have been made only in the year 1813, he adds, that he did not mean to raise doubts as to the originality of Soemmerring's invention.

On the 24th March, 1818, Baron Schilling wrote to Soemmerring to announce to him that his Majesty the Emperor Alexander I. had made him a Knight of the Order of St. Anne of the second class. In the following year (3rd November, 1819), the Imperial Academy of Sciences at St. Petersburg elected Soemmerring an honorary member.

Soon after the Congress of Aix la Chapelle, on the 7th December, 1818, Count Capo d'Istria, and on the 22nd of the same month, Prince Alexander Sergejewitch Menschikoff, came with Count Pahlen to Soemmerring, to see experiments with the telegraph.

These visits gave Soemmerring much pleasure. He wrote to Schilling about Count Capo d'Istria:—"Never has any body, except yourself, at the first glance comprehended every thing so clearly, and conceived how easily the telegraph might be applied on a large scale."

In 1819 there was a prospect of Soemmerring's telegraph being brought to London.

Already, on the 3rd of June, 1817, Count Arco, brother to the Countess Montgelas, had introduced to Soemmerring Lionel Hervey,* then lately appointed British Secretary of Legation at Munich, in order that he might have an opportunity of seeing the telegraph.

In 1819, on the 10th of May, when Soemmerring was about to go for a time to Frankfort, Count Arco informed him that Hervey wished to pay him another visit.

They both came two days after, and Soemmerring explained to Hervey the telegraph in all its details. On the 17th Hervey came again alone, and expressed his wish to get such a telegraph for England.

Soemmerring sent him the complete apparatus on the 25th May, and added an instruction, in English, about the way of using it. He expressed the hope "that Sir Humphry Davy would receive the telegraph favourably, perhaps improve it, and further its application to use in Great Britain."

After Soemmerring's return from Frankfort—where I had the pleasure of paying him my respects—he learned on the 20th May, 1820, that Hervey had not sent the telegraph to England. He got it back with the strange remark, that Hervey had not forwarded it, fearing difficulties at the custom house!

(*To be continued.*)

* In May, 1816, Soemmerring accompanied Baron Schilling to Solenhofen, near Eichstadt, where the best lithographic stones are quarried. He got here organic fossils for his collections. Already in 1810 he had described the interesting animal which he, from the likeness of its head with that of a bird, called Ornithocephalus, and which he considered to be a mammal, a bat, from which opinion, however, Cuvier differed, taking it to be a reptile, and calling it Pterodactylus. Later Soemmerring described a similar animal, which he named Ornithocephalus brevirostris, the former being longirostris; also two others, Crocodilus priscus, and Lacerta gigantea. The first described Ornithocephalus remained as one of the most remarkable objects in the Museum at Munich, where Agassiz, when studying medicine at that place, was, in 1828, first led to the study of fossils, in which department he subsequently succeeded in accomplishing so much. A cast in plaster of Paris of the Ornithocephalus longirostris, which Soemmerring had shown me in 1819 in Frankfort, where he then lived for a time, I have now seen again in the British Museum in London, besides other fossils that were in Soemmerring's possession.

HORTICULTURAL SOCIETY OF LONDON.

A second special meeting of the members of this Society, for the purpose of considering the steps taken by the Council, with the view of obtaining a site for a garden at Kensington-gore,

* Lionel Charles Hervey was the grandson of one of the sons of John Hervey, who, in 1714, was created Earl of Bristol. His elder brother, Felton, had, in 1801, adopted the name of Bathurst, in addition to that of Hervey. In Dod's "Baronetage" it is erroneously stated, that Bathurst had adopted the name of Hervey. He was Aide-de-Camp to the Duke of Wellington at Waterloo, and is one of those who signed the important Convention at Paris, on the 3rd July, 1815. Lionel Hervey was, from 1820 till 1823, Secretary of Legation, officiating also, for a time, as Minister, at Madrid; he died in 1843.

was held on Wednesday morning, in the Great Room of the Society of Arts, the Earl of Ducie in the chair.

On opening the proceedings, the Chairman, after referring to the statement which was made by the Council at the last meeting (of which an account appeared in the *Journal* for the 8th inst., p. 579), said that he was most happy to inform the meeting that certain modifications in the proposed lease had been agreed to by the Royal Commissioners, on terms much more beneficial to the Society and the interests of the public. It gave him much gratification to inform them that, although no exertions had as yet been made to raise the necessary funds, £11,000 and upwards had been already subscribed to forward the objects the Society had in view. He would conclude by observing that in regard to the plans for the new garden, the Society were not pledged to carry them out in all their details, and that the Council would exercise every precaution in fixing upon such as would meet the approbation of all by their general excellence. The Secretary then read the list of subscriptions which had been received, and the names of those who had become members, together with those who had taken the debentures of the society. Among the subscribers the name of Her Majesty appeared for £1,000, that of the Prince Consort for £500, while all the Royal children were enrolled as life members. The Prince Consort, in addition to his subscription, has taken debentures to the value of £500. The list amounted to more than £11,000. The secretary then proceeded to explain to the meeting what steps had been taken with the Royal Commissioners in regard to the renewal of the lease, and read a letter from the commissioners, from which it appears that the commissioners will be willing to renew the lease for a similar period and upon the same terms as to rent and management as at present, upon the following conditions:—1. That two years' notice must be given previously to the expiration of the first lease; 2. That the commissioners shall reserve to themselves a power to decline to renew the lease upon taking on themselves the responsibility of any debentures of the society that may be outstanding at the expiration of the 31 years, to any extent not exceeding a maximum of £20,000; 3. That the society shall agree to devote in each year, during the continuance of the lease, not less than 50 per cent. of the moiety of the net surplus balance of the receipts (after the commissioners' claim for rent is satisfied) for the purpose of paying off outstanding debentures; 4. That in the event of the society being unable for five consecutive years to pay the interest on the £50,000 borrowed by the commissioners, the commissioners shall have the right of re-entry without payment of compensation to the society; and lastly, that the society shall not underlet or dispose of their lease without the consent of the commissioners. A conversation then took place as to the propriety of accepting the offers of the commissioners, the principal topic of disagreement being as to the right of re-entry if the society failed to pay the interest on the £50,000 for five consecutive years, during which, in answer to various questions, the secretary stated that the council had resolved that the debentures should be of the value of £100 each, bearing interest at 5 per cent., payable half-yearly, and that the holders of debentures would have a free admission to the gardens. He explained the difference of the privileges of subscribers of 40 and 20 guineas, the means that would be adopted for paying the interest on the £50,000, and informed the meeting that in respect to the society's gardens at Chiswick, the Duke of Devonshire had expressed his willingness to take from the society any portions of the ground they might think fit, and to allow them to retain what would be necessary for their purpose, and that under the conditions of the Chiswick lease the society had the right of moving all buildings requisite for plants, and all plants that might be moved without damage. The following resolution, moved by Sir Philip Egerton, and seconded by the Duke of Leinster, was then read:—

"That this meeting approves of the steps already taken by the Council, authorizes the negotiations with the Royal Commissioners to be continued, and empowers the Council to proceed to raise the sum required for the construction of a garden at Kensington Gore, and if the money shall be obtained, to complete the arrangements."

A long discussion ensued before this resolution, which was ultimately carried unanimously, was adopted, in which Sir Joseph Paxton took a prominent part, insisting that the conditions of the commissioners, as altered, were infinitely worse than before, and concluding his speech with a motion that the meeting adjourn until this day fortnight, in order to give time for further communications between the Society and the Royal Commissioners. He subsequently, after a long discussion, withdrew his motion, and proposed that the following instruction, which was carried unanimously, should be addressed to the Council:—"That the Council be instructed not to accept the clause about re-entry in case of failing to pay interest for five years, and that in the event of the commission cancelling the lease an equitable arrangement of mutual interests be made." The Duke of Leinster then proposed a vote of thanks to the chairman, which having been unanimously agreed to, the meeting separated.

The drawings and plans of the proposed garden are still at the House of the Society of Arts for inspection.

NEW ZEALAND FLAX.

The following announcement has recently been made by the Government of New Zealand, extending for two years the time within which the rewards offered may be claimed:—

Colonial Secretary's Office, Auckland, 19th March, 1859.

The Government of New Zealand is prepared, subject to the undermentioned conditions, to give rewards to the amount of £4,000, for the discovery of efficient means for rendering the flax, and other fibrous plants of New Zealand, available as articles of export, viz.:—

£2,000

To the person who shall, by some process of his own invention, first produce from the *Phormium Tenax*, or other fibrous plant indigenous to New Zealand, one hundred tons of merchandize.

£1,000

To any person, other than the person entitled to the first reward, who shall, by some process of his own invention, next produce from the *Phormium Tenax*, or other fibrous plant indigenous to New Zealand, one hundred tons of merchandise.

£1,000:

Viz.:—£200 to each of the first five persons, other than those entitled to the first and second rewards, who shall by any process, whether of his own invention or not, produce from the *Phormium Tenax*, or other fibrous plant indigenous to New Zealand, twenty-five tons of merchandise.

The merchandise must be saleable as an article of export from the colony of New Zealand, and have been produced at a cost not exceeding 75 per cent. of its value at the port of entry from which it is exported; and the process must be fully made known with a view to the discovery being at once made available to the public.

His Excellency the Governor of New Zealand will from time to time appoint commissions, to consist of not less than three persons, to act at such places as circumstances may require, and each claim for reward will be referred to such Commission as may be considered the most con-

venient for its proper investigation. The acts of the majority will be deemed the acts of the Commission.

Each Commission shall be at liberty to adopt such means as it may deem most fit for determining the value and cost of production of the merchandise, for ascertaining the process employed, and for fully investigating in all respects and reporting upon the validity of any claim.

Every claim for reward must be preferred in writing before the 1st January, 1861, to the principal officer of customs, at the port of entry nearest to the place where it is desired that the examination of the merchandise shall take place, who will at once proceed to ascertain whether the full quantity in respect of which the reward is claimed is ready for examination, and if such quantity is ready, he will give a certificate to that effect, dated on the day on which he shall have ascertained the fact, and such day shall be deemed to be the day on which the merchandise was produced.

Whenever any officer of customs is required to go more than three miles from his residence, his travelling expenses must be paid beforehand by the person requiring his attendance, and he cannot be required to attend a second time if the quantity was found deficient on the first occasion.

One half of any reward will be paid at once to any person whom a commission shall report and the Governor shall have determined to be entitled to the same—after which no other claim to the same reward will be entertained—and the other half upon satisfactory proof being given to the Governor of the *bona fide* sale of the merchandise in Europe, at an advance of not less than 20 per cent. upon the *bona fide* actual cost of the article landed in Europe.

By his Excellency's command,
HENRY JOHN TANCRED.

Home Correspondence.

ELECTRO-DEPOSITS ON ENGRAVED COPPER-PLATES.

SIR,—It was not my intention to have again reverted to the subject of electro-plating engraved copper-plates, more especially in answer to the correspondence of Mr. George T. Doo, of Great Stanmore, and M. F. Joubert, of Porchester-terrace, which appeared in the *Journal* of the 4th of March last. Certain experiments, however, which I have conducted induce me to address you again upon the subject.

Mr. Doo, in reply to my statement that "It is a tolerably well-known fact amongst those conversant with electro-metallurgy as applied to printing purposes, that engraved copper-plates have since many years been coated with silver and gold, for the purpose of protecting the plates from wear while being printed," observes, "Will Mr. Bradbury state any instances for the information of those who, like myself, are unacquainted with the fact?"

In 1852 and 1853, I had the privilege of intimately studying for a period of nearly twelve months the operations of printing in all its practical and scientific bearings, in the Imperial Printing Office at Vienna, where every new application or discovery, if not practised, had been already well-known. On my return from Vienna I made a practical acquaintance with the operations of the most famous private continental printing establishments, such as Prague, Berlin, Frankfort, Brunswick, Leipsig, and Paris, and found it was well-known that copper had been applied to the surface of stereotype plates, that gold and silver had been used to protect engraved copper-plates, and that platinum had been tried but had failed from a want of knowledge how to throw down a deposit in a bright state—at the present time possible, but still even now difficult to effect. During 1853-1856 I frequently printed from engraved copper plates covered with gold and silver, and moreover discovered special solutions for the purpose,—such as I have never seen described in any published work, and which I have found to possess durability greater than I have been able to produce from any other silver or gold solution.

The following extract from my printed Lecture "On the Security and Manufacture of Bank Notes," delivered in May, 1856, at the Royal Institution, will furnish some evidence that the subject of hardening engraved copper plates was not new to me.

"Since the discovery of the Electrotype, efforts have been made to apply its perpetuating power to the reproduction of copper engravings generally, with no other result than failure. The average number of impressions from one plate rarely reached 500. Little attention had been paid to the science of electro-deposition; failure arose from want of confidence in its power, and want of energy in its investigation. At the present time, partly owing to the perfection at which the process of electro-deposition has arrived, and partly owing to an additional new agency brought into co-operation, I can state that an experiment was recently made, to establish in this country (for it has long been in successful operation at Vienna) its practical adaptability. The experiment was made upon the Bank Notes of the National Bank of Brazil: 1,200,000 notes of high class work, were printed from Electrotype plates; the last note printed was identical with the first. The electro-plates, partly I say, owing to the increased hardness in the copper deposited, and partly owing to a particular method of treatment—the additional new agency—yielded on an average 1600 perfect impressions—and experiments are in course of operation for increasing this to between 3000 and 4000."

M. Joubert, in his letter of the date of the 1st of March, states that in reference to gold and silver having been used, "This is contrary to facts, and all the printers with whom I have acquaintance, after being consulted, will bear testimony that Mr. Bradbury is in a complete error; that there was a great desideratum for some means of protecting engraved copper-plates from wearing away as they do while at printing, and that the principal houses in London, Messrs. Macqueen, Messrs. Brookes, and others hailed with great satisfaction the introduction of my process." M. Joubert admitted to me at a personal interview, that he had travelled, but subsequently to me, over the same ground in Germany for similar purposes as myself. M. Joubert had the same opportunities of learning, with the difference that I had applied myself to study practically, while he had done so but superficially. It does not then follow, because he could not arrive at learning certain well-known facts, that I could not have done so. On our comparing notes together, M. Joubert was somewhat disconcerted at finding that I knew considerably more of the chemical and scientific applications of printing than himself. In fact, he was not prepared for finding me so generally acquainted with the scientific operations of our *confrères* on the Continent.

However, I withheld nothing from M. Joubert. I addressed myself unreservedly to him, wishing to serve him if possible; indeed I went so far as to state that I did not consider his patent as likely to be a valid one, and advised him in a friendly way to go to his agent, Mr. Carpmael, to communicate the same to him, with a view of his taking extra steps for preventing invalidity arising from any imperfection in drawing up the specification. I made no secret of my feeling on the point, and I agreed to negotiate, on the assumption that the patent was good. M. Joubert would not consent, previously to my agreeing to the terms of negotiation, to my seeing the specifications of his patent.

This appeared very strange to me, because it showed great distrust on his part while he was negotiating for what was *tantamount* to a partnership, and especially as within a week from that time his specification in the ordinary course would have been and was published.

Naturally there was an end to all negotiation.

M. Joubert then again remarks, "That other metals besides gold, silver, iron, and zinc, should be capable also of yielding deposits in a manner so as to render them useful for printing purposes, is nothing new to me, and it is of course open to any one to try them." The truth of this statement is so obvious that comment is unnecessary. M. Joubert has a perfect right to practice and enjoy any benefit arising from the use of his iron deposit, but M. Joubert should allow those who prefer to use other electro-deposits to do so without molestation or misstatement.

"As to cost," says M. Joubert, "the notion, as advanced by Mr. Bradbury, of being able to deposit palladium at two pence and platinum at one penny per square inch is simply an hallucination worthy of the assertion by the same person, of being able to print off 2,000 good impressions from a zinc deposit; besides the extreme difficulty of removing the coat of platina from the surface of an engraved copper-plate would be a serious bar to using that metal with any degree of safety."

M. Joubert, it would appear, is fond of long and high-sounding words. I again repeat, that 2,000 impressions may be obtained from an electro-zinc facing if the deposit be made with care from a combined solution of chloride and cyanide of zinc. I have done it; others, therefore, who will bestow the requisite care, may do the same. I have never compared the merits of the iron process with those of zinc. I have left M. Joubert to do that. Practically speaking, 2,000 impressions from a zinc deposit, are as good as 5,000 from an iron deposit, especially if the same means for recoating apply to the one as to the other.

Mr. Joubert strongly doubts—(nay more, he accuses me of speaking under a state of hallucination)—my being able to deposit palladium at two-pence, and platinum at one penny per square inch. I am not surprised. Did M. Joubert practically understand electro deposition, he could not do otherwise than acquiesce in my statement. What I state is an absolute fact. M. Joubert, however, knows or ought to know, that iron and zinc can be deposited at a cost of one farthing per square inch; whereas he is charging (I am speaking from personal knowledge) at rates varying from twopence to sixpence per square inch. No wonder M. Joubert is so tenacious of his process.

M. Joubert again advances as one great result of his iron process, the extreme facility it affords for removing the coating of iron when showing signs of wear, for the purpose of allowing of its renewal. On this point there is a new light:—experiments with pure nickel deposits—obtained from using a positive pole of pure nickel (difficult to obtain), show results of a new and very important character,—results which produce advantages beyond those to be obtained from iron deposits, not in point of the number of impressions each deposit will yield (and nickel will yield 5,000 impressions and upwards); because pure nickel, being a noble metal, is not oxidized by air, and even stands the weaker acids; and because, moreover, from the extreme fineness of the texture of the metal so deposited, it is not necessary to remove the coating when showing signs of wear, for the purpose of receiving a fresh deposit. Nickel gives a surface kinder, for printing purposes, than either steel, copper, or any of the known metals; the reason being simply that in addition to hardness, it possesses the smoothest, firmest, and brightest surface to be obtained from electro deposition. An engraved copper plate may be covered and recovered *ad infinitum*, thereby preserving the integrity of the original work to an illimitable number of impressions.

Again, if coloured inks made from metals be used, such inks do not in the least degree act upon nickel as they are known to do upon steel and copper. Nickel may be deposited at the same nominal cost as platinum and palladium, viz., from a penny to two pence per square inch.

The purity and the extreme fineness of nickel deposit—its non-oxidation—the facility of throwing it down—its yielding 5000 impressions and upwards from one coating—place the electro-nickel facing immeasurably above electro-iron facing as it has hitherto been done. Number of impressions alone does not constitute the sole merit in this particular application of electro-facing. Electro-iron facing hitherto has varied from 1000 to 9000 impressions, according to M. Joubert's own statement, whereas with proper manipulation there ought not to be any variation.

M. Joubert would oblige many inquiring minds by his stating upon what principle he entitles electro-iron facing —*acierage*.

I am, &c.,
HENRY BRADBURY.

Whitefriars, July 9th, 1859.

[This letter has appeared in the *Daily News*.]

SIR,—As Mr. Henry Bradbury, in a letter which has appeared in the *Daily News*, has thought fit to reopen the discussion upon the merit of my process, which I had thought closed, I trust you will in fairness insert these few lines in answer.

I pass over all the personal matter—with that the public can have no interest—and they can easily judge where good taste indicates a limit in a public discussion —but as it is important to avoid any one being misled by erroneous statements, I shall simply answer two or three of Mr. Bradbury's startling assertions, and this on scientific grounds.

1st. Is it correct to say:—"Practically speaking, 2,000 impressions from a zinc deposit are as good as 5,000 from iron deposit, especially if the same means for re-coating apply to the one as to the other?"

Now, suppose Mr. Bradbury receiving another order for 1,200,000 impressions, like the one he alludes to in his letter, and see the result. He would require to have 600 coatings, whereas, through my process, as acknowledged by Mr. Bradbury himself, 225 coatings at most would only be required. Is Mr. Bradbury prepared to maintain that, in point of expense, labour, and saving of time, the result would be the same in both cases?

2nd. As to nickel deposit, the idea very early suggested itself to me, but then the expense on the one hand —considering the cost of pure nickel—and the liability to accidents in removing the worn coating from the plates deterred me from following it up. Mr. Bradbury thinks he has hit upon turning the difficulty by suggesting that the new coating might be deposited over the worn-out one, thereby showing a total want of practical knowledge of the matter; for the result of such a process would be to add an extra thickness of metal on the portions of the plate where the coating was still subsisting, whilst on the worn portions there would only be the fresh coating just deposited, thereby destroying the harmony previously existing in the plate.

This notion displays a great want of artistic knowledge; and on a recent occasion, where I acieraged a large engraved copper-plate, for which nearly four thousand pounds had been paid, it would have been a most dangerous experiment to try the use of nickel.

Mr. Bradbury has only resorted to zinc deposition since I disclosed my process to him last summer, and he might have endeavoured to bring it forward without attempting to depreciate my mode of operating; if he can do as well, and at a more moderate charge than myself, at the same time offering to the public the same security that I do from my professional experience, he need not fear to see the tide of business running all on my side.

I remain, &c.,
F. JOUBERT.

Porchester-terrace, July 12, 1859.

LOCAL BOARDS AND THE YORKSHIRE UNION.

SIR,—As a Yorkshireman, I regret that our Sheffield representative did not repudiate the reflection cast upon the local examiners, by Mr. Barnett Blake, of the Yorkshire Union.

This gentleman, in the course of his remarks at the Conference, said, "What security had the candidates of one Local Board, that the Examinations of another Local Board, perhaps in the same town, had been conducted

with perfect fairness?" Our immortal Bard says, "suspicion ever haunts the guilty mind;" but I hope the opinion of Mr. Blake is better than his expression of it. The Local Boards on the whole have given great satisfaction, and it is questionable whether Mr. Blake's resolution would have been an improvement. From the silence of the Yorkshire delegates, persons unacquainted with the matter would suppose that the towns in Yorkshire were difficult to manage and hard to please. Well might the Rev. Canon Girdlestone imagine, "that it was in Yorkshire alone where these explosive elements were alleged to exist."

I quite concur in Mr. Chester's opinion, that the last annual report of the Yorkshire Union did not place the Society of Arts' Examinations in a favourable light. In fact, some parts of that report appear to me to be quite antagonistic to the Society's Examinations. For instance, the following:—"Your committee regret to have to report that the success of the Examinations held by the Society of Arts has not been such as could be desired. The plan has, moreover, suffered from the want of due publicity indispensable to success, the absence of systematic organisation of Local Boards of Examiners, and the shutting out of all candidates from Institutions which did not contribute to the Society of Arts. * * * This is by no means satisfactory, and the opinion is gaining ground that a remedy will only be found in a county organisation, or the aid of some responsible body more willing than the Society of Arts to make the examinations a practical fact."

It is, however, a "practical fact," that the Yorkshire Union, with its 24,400 members, does not contain all the intellect in the county, because Leeds, Halifax, Bradford, and Sheffield, have competed and have reason to be satisfied with the result.

The fable says, when the fox could not obtain the grapes, he declared they were sour, and I suppose our Yorkshire Union friends, by a parity of reasoning, suppose the certificates of the Society of Arts are worthless. The "practical fact" that Yorkshire obtained one-third of the prizes (and this without much assistance from the institutions represented by Mr. Blake), speaks well for the intellect, as well as for the ability of the various Local Boards in the county. I believe that the sentiments of every Sheffield competitor are favourable to the ability as well as to the honourable conduct of our local examiners.

Whatever difficulty some places have had in selecting gentlemen to discharge these onerous duties, it is not because it is difficult to please a Yorkshireman, but more probably from some gentleman being determined to "ride the first horse" or else not ride at all.

Our Local Board, under the presidency of our respected vicar (Canon Sale), worked harmoniously together, were attentive to their duties, saw that our papers were worked out in accordance with the recommendations of the Council of the Society of Arts, and in the absence of positive evidence to the contrary, I shall continue to believe that the Local Boards throughout the United Kingdom gave general satisfaction. As an individual, I do not object to the Yorkshire Union founding a "county organisation, or the aid of some responsible body more willing than the Society of Arts to make the examinations a practical fact," but the honour of establishing examinations belongs to the Society of Arts, and if the students belonging to the Yorkshire Union shrink from the contest, I fear that they are not up to the required standard.—I am, &c., A SHEFFIELD WHITTLE.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 13th, 16th, and 17th June, 1859.

Par. No.
28. Mercantile Marine Fund—Account.
31. West India Colonies and Mauritius—Papers, Part 1.
17. Seamen's Savings Banks—Account.
19. Metropolis Turnpike Roads—33rd Report of Commissioners.
24. Cambridge University—Copy of a Statute.
3. Bills—Church Rates Abolition.
1. ,, Endowed Schools.
4. ,, Edinburgh, &c. Annuity Tax (Scotland).
5. ,, High Sheriffs Expenses.
6. ,, Newspapers, &c.
7. ,, Criminal Justice, Middlesex (Assistant Judge).
8. ,, Fishing Vessels passing the Nore.
9. ,, Galway Harbour and Port Act (1853) Amendment.
10. ,, Adulteration of Food, &c.
11. ,, Belfast Borough.
12. ,, Constabulary Force (Ireland).

FIRST SESSION, 1859.

251. Population, Inhabited Houses, &c.—Return.
230. Postal Communication with North America—Mail Servic (Galway and America)—Return.
231. Railway Acts—Return.
68 (3). Trade and Navigation Accounts (31 March, 1859)—(Corrected Pages).

Delivered on 18, 20, and 21 June, 1859.

8. Sugar, &c.—Return.
9. Foreign Sugar—Account.
11. Copper, &c.—Return.
7. Church Rates, &c.—Return.
12. Fire Insurance—Return.
16. Public Works (Ireland)—Account.
32. Administration of Justice (East India and Ceylon)—Return.
34. Committee of Selection—1st Report.
35. Railway and Canal Bills—Report from General Committee.
6. Direct Taxation—Return.
23. Population, &c. (Scotland)—Return.
25. Shipping—Returns.
33. Thames Conservancy—General Report.
Italy—Further correspondence respecting the affairs of.

FIRST SESSION, 1859.

224. Gas (Metropolis)—Report from Committee.

Delivered on 22nd June, 1859.

29. Court of Chancery—Return.
36. British Museum—Account and Estimate.
37. Ecclesiastical Revenues (Durham)—Return.
Decimal Coinage—Final Report of the Commissioners.
Lake Superior and the Red River Settlement—Papers.

Delivered on 24, 25, 27, 28, 29, and 30 June, 1859.

4. East India (Courts Martial)—Return.
41. General Committee of Elections—Mr. Speaker's Warrant.
10. Coinage—Accounts.
42. Trade and Navigation—Accounts (31 May, 1859).
30. Finance Accounts—Classes 1—8.
15. Bill—Appeal in Criminal Cases.

FIRST SESSION, 1859.

254. National Education (Ireland)—Papers.
244. Pilotage—Abstract of Returns.

Delivered on 1st July, 1859.

39. Hops, &c.—Returns.

Delivered on 2nd and 4th July, 1859.

38. India and China (Exports and Imports)—Returns.
43. Railway and Canal Bills—2nd Report from General Committee.
44. Committee of Selection—2nd Report.
26. Steam Vessels—Return.
46. Italy—Return.

PATENT LAW AMENDMENT ACT.

APPLICATION FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 15th, 1859.*]

Dated 9th June, 1859.

1402. W. Bumess, 2, Prospect-terrace, Brixton, Surrey—Imp. a steam culture machinery, part of which is applicable to steam cartage and other purposes.

Dated 16th June, 1859.

1450. T. W. Jones, 35, George-street, Hanover-square, Middlesex—Stereoscopic glasses for single pictures.

Dated 18th June, 1859.

1472. J. Firth, Heckmondwike, near Leeds, and J. Crabtree, Mill Bridge, Leeds—Imp. in the manufacture of carpets.

Dated 21st June, 1859.

1494. L. D. Owen, 192, Tottenham Court-road—Imp. in machinery for manufacturing bolts and nails. (A com.)

Dated 27th June, 1859.

1532. R. Dick, Toronto, Canada—Keeping accounts current in printed form, for addressing cards, circulars, papers, and periodicals of all kinds, with great rapidity, by the aid of a very simple machine, which is a constituent part of this invention.

Dated 28th June, 1859.

1539. W. E. Newton, 66, Chancery-lane—An imp. in variable cut off gear for producing expansion in steam and other motive engines. (A com.)
1541. J. M. J. Baillie, 15, St. Mary Axe, London—A new process for tanning hides and skins. (A com.)

Dated 29th June, 1859.

1542. J. Nash, Mill Wall, Middlesex—An improved disengaging block.
1543. G. Hall, junr., Montrose—Imp. in reaping machines.
1544. A. McDougall, Manchester—Imp. in the preparation of disinfecting and antiseptic substances.
1547. W. Wilkinson, Bayswater, and D. White, High Holborn—Imp. in apparatuses for holding, regulating, compressing, and burning gas and other gaseous fluids, parts of which apply to the holding of liquids.
1548. I. Tirebuck, Windsor-court, London—Improved machinery for printing from engraved plates.
1549. W. J. T. Williamson, 37, Gerrard-street, Soho—Imp. in gas burners.
1550. G. Chapman, Rutland street, Leicester—Imp. in knitting machines.
1551. J. J. Griffin, 119 and 120, Bunhill-row—Imp. in gas furnaces suitable for fusing refractory metals.
1552. G. Baker, Birmingham—Imp. in the manufacture of metallic lattice or trellis work. (A com.)

Dated 30th June, 1859.

1553. E. Francis, Wrexham, Denbighshire—Apparatus for facilitating the making up or packing of sugar, and other articles of grocery, and other substances.
1555. R. Kay, J. Manock, J. Whittaker, and T. Booth, Heywood, Lancashire—Imp. in machinery for slubbing, roving, spinning, and doubling cotton, and other fibrous materials.
1556. W. Bestwick, Salford, near Manchester—Imp. in crinoline steel for ladies' dresses, skirts, and other similar purposes.
1557. R. A. Brooman, 166, Fleet-street—Imp. in lithographic and chromo-lithographic presses. (A com.)
1558. L. Boigeol, Giromagny, near Belfors, France—Improved machinery for winding and twisting fibrous materials.
1559. T. Bell, Plaistow, Essex—Imp. in the manufacture of manure.
1562. J. A. Wilkinson, Brooklyn, U.S.—Imp. in printing presses and apparatus connected therewith.
1563. W. Summerscales, senr., and J. Summerscales, Keighley, Yorkshire—Improved wringing and mangling machine.
1564. J. Bernard, Albany, Piccadilly—Imp. in uniting certain parts of boots and shoes, and in the means employed therein.

Dated 1st July, 1859.

1565. J. R. Beard, Manchester—Imp. in the manufacture of artificial whalebone, applicable to umbrellas, parasols, hats, stays, bonnets, reeds, crinolines, and other similar purposes.
1566. A. Jones, Blackburn, Lancashire—Imp. in machinery or apparatus for drawing-in, twisting, or looming textile materials.
1567. B. Standen, Salford—Imp. in the deodorizing and separation of fœcal and putrescent organic matters, in the preparation or manufacture therefrom of a portable artificial manure or fertilising compound, and in apparatus to be employed in such preparation or manufacture.
1568. A. Carron, 25, Little Moorfields, London—An improved loom for the manufacture of silk and other velvet. (A com.)
1569. N. Ardaseer, Bombay, East Indies—An improved method of making steam boilers.
1570. J. B. Howell, Sheffield—Imp. in the treatment of iron.
1571. E. W. Carter, Rochdale—Imp. in machinery or apparatus for sewing.
1572. E. A. Wood, Victoria-terrace, Notting-hill, and M. D. Rogers, Bromley, Middlesex—Improved apparatus for raising and lowering boats.
1573. S. Fisher, Birmingham—Imp. in ordnance and projectiles.
1574. R. Royds and A. Harcourt, Woolston, Hants—An improved composition for protecting the bottoms of ships and other structures of iron.
1575. W. Riddle, Westbourne-terrace, Barnsbury-park, Islington—Imp. in advertisement show cards or boards.
1576. W. E. Kenworthy, Water-lane, Leeds—Imp. in purifying gas, and saving of lime in the said purifying.
1577. M. Bogg, Duggleby, near Malton, Yorkshire—Imp. in washing machines.

Dated 2nd July, 1859.

1578. C. H. P. Cook, Glasgow—Imp. in ventilators and ventilating flue or chimney tops.
1579. R. W. Morville, Pendleton, Salford—Imp. in mechanism, or arrangements for suspending and securing window sashes. A com.
1580. T. J. Hart, Birmingham—Imp. in breach loading fire-arms.
1581. C. G. Guy, Liverpool, J. Brough, and R. Cotton—An improved upright steam boiler.
1582. E. Fourmaux, junior, Provin—A new weaving loom.
1583. C. H. G. Williams, 32, Regent-square, Gray's-inn-road—Imp. in dyeing fabrics and yarns.
1584. H. Hirsch, Berlin, Prussia—Imp. in screw propellors.
1585. H. Harris, Newport, Isle of Wight—An improved method of connecting together the parts of which bedsteads and other furniture are composed.

Dated 4th July, 1859.

1586. J. Simon, Paris, Passage des Petites Ecuries, No. 5—A composition named zeiodelite, a kind of paste which becomes as hard as stone, is unchangeable by the air, and being proof against the action of acids, may replace lead and other substances for various uses.
1587. J. Hollingworth, Clyde Paper Mills, Eastfield—Imp. in machinery or apparatus for the manufacture of paper.
1588. R. Lane, Cirencester—Imp. in mills for grinding grain and other materials.
1590. R. A. Brooman, 166, Fleet-street—An improved hemmer or apparatus, to be used in connection with sewing machines, for turning over and presenting the edge of the material to be hemmed properly to the needle. A com.
1591. R. A. Brooman, 166, Fleet-street—A cementing powder or mixture, and process for cementing, converting, refining, strengthening, and steelifying iron. A com.
1592. A. V. Newton, 66, Chancery-lane—An imp. in the process of, and improved apparatus for, separating metals from their ores. A com.

Dated 5th July, 1859.

1593. J. McIntosh, Glasgow—Imp. in the manufacture of leather driving belts.
1594. W. Knapton, of Albion Foundry, Monkbar, and A. Aitchison, Knottingley, Yorkshire—Imp. in the manufacture of gas.
1597. W. E. Newton, 66, Chancery-lane—Improved apparatus for moving iron and other metals while the same is in process of manufacture at the rolls. A com.
1599. J. Watkins, Cwmamman Colliery, Aberdare, Glamorganshire, and J. Pugh—Imp. in lubricating wheels.

Dated July 6th, 1859.

1601. J. Luis, 1B, Welbeck street, Cavendish-square—An apparatus for washing wool, manufactured or not, and all other matters. A com.
1603. J. Horton, Dudley—A new or improved gas meter.
1605. S. B. Haskard, Wollaton-street, Nottingham—Imp. in the manufacture of hook guides used in machines for the making of lace or other fabrics.
1607. L. Schwartzkopff, Berlin, and F. C. Philippson, Dusseldorf—Imp. in steam hammers, and in machines for cutting files, and for planing and grooving iron, stone and other substances.
1609. J. T. Edmonds, Prestwood, Great Missenden, Bucks—Imps. in winnowing or corn-cleaning machines, parts of which are applicable for other screening or sifting purposes.

Dated 7th July, 1859.

1613. J. Knowelden, Southwark, Surrey, and D. E. Edwards, Upper Belgrave-place, Middlesex—Imp. in hydraulic engines and pumps, and the employment of apparatus for applying motive power.
1615. Sir F. C. Knowles, Bart., Lovell-hill, Berks—Imp. in making iron castings.
1617. W. Robinson, Wembdon, Bridgewater, Somerset—Imp. in cask washing machines.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1621. W. Waite, York-house, No. 48, Baker-street, Portman-square—Manufacturing bonnets, hats, and other articles, partly or entirely from the leaves of the palm tree, or other flat or thin material.—8th July, 1859.

WEEKLY LIST OF PATENTS SEALED.

[*From Gazette, July 15th*, 1859.]

July 13th.

120. J. Barrans.

July 15th.

128. Joseph Eccles.
143. R. G. Salter.
144. G. Collier and J. Collier.
149. G. Hamilton.
151. C. D. Archibald.
152. R. A. Brooman.
156. W. Trotter.
160. P. A. Sparre.
162. E. T. Hughes.
164. E. Stevens.
166. W. Poupard.
171. H. Hilliard and T. Chapman.
172. A. Lindo.
176. S. Phillips.
189. R. Howell and R. J. Willder.
245. T. Hartshorne.
252. G. F. Bradbury and J. J. King.
256. W. Robertson.
301. S. Tearne.
336. T. R. Ayerst.
496. S. Russell.
511. T. C. Hinde and G. J. Hinde.
556. W. E. Newton.
986. C. Batty.
1004. J. Davies.
1002. G. Roberts and J. Bridges.
1043. H. Allman.
1160. F. N. Hadlow.
1167. W. F. Nuthall.

[*From Gazette, July 19th*, 1859.]

July 19th.

161. T. Clarke.
163. J. Whitehead.
179. J. Bent.
185. L. Le Prince.
194. J. H. Hume.
197. J. Newman.
206. T. W. Rammell.
208. R. Barter.
216. J. Fowler, R. Burton, D. Greig, and J. Head.
276. J. Robertson.
281. L. Rigolier.
328. J. Honeyman.
432. A. V. Newton.
926. R. Coleman.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, July 15th*, 1859.]

July 13th.

1660. W. Clibran and J. Clibran.
1670. H. Turner.
1767. W. Wood.

[*From Gazette, July 19th*, 1859.]

July 14th.

1683. J. Cartwright.

July 15th.

1684. Rev. G. Jacque.
1701. J. L. Crockett.
1705. J. L. Crockett.

July 16th.

1674. T. Duncan.
1758. G. Collier, J. Crossley, and J. W. Crossley.